Questions and Answers on the Local Area Unemployment Statistics (LAUS) Program Redesign for 2005

What is the LAUS Redesign?

The LAUS Redesign is a multi-year, multi-project initiative to improve labor force estimates for State and substate areas developed by the LAUS program. Funding for the LAUS Redesign research and implementation activities was initially provided to BLS in FY 2001.

The LAUS Redesign includes:

- Improved time-series models for currently modeled areas--all States, the District of Columbia, New York City, the Los Angeles metropolitan area, and the respective balances of New York and California.
- Real-time benchmarking to national Current Population Survey (CPS) estimates and improved historical benchmarking of model estimates to reliable national CPS estimates. (See question 4 for an explanation of real-time benchmarking.)
- The introduction of time series models for up to six additional metropolitan areas (and respective balances of States).
- Enhanced procedures for developing other substate area LAUS estimates that employ innovative and dynamic estimating methods.
- The implementation of 2000-Census based configurations for metropolitan areas, metropolitan divisions, micropolitan areas, and small labor market areas.
- The incorporation of 2000-Census inputs and updates in the methodology.

When will the LAUS Redesign changes be implemented?

The changes will be implemented with January 2005 estimates. Region and State labor force estimates will be released on March 10, 2005, and metropolitan areas on March 18.

Why is BLS making these changes?

A number of significant and long-standing issues have been identified with the current method of model estimation and annual benchmarking that affect accuracy and analysis of the estimates. The current model approach does not provide for error measures and requires external seasonal adjustment. The current benchmarking method reintroduces sampling error into the monthly series, which results in significant end-of-year revisions in a number of States, causes discontinuities between December-benchmarked and January-modeled estimates, introduces spurious cyclical fluctuations, and does not adequately reflect the effects of major national shocks to the economy in the State estimates.

The Redesign method of model estimation will result in improved seasonal adjustment and provide error measures on the seasonally adjusted and not seasonally adjusted series. Real-time benchmarking to the national CPS measures will ensure that national economic events are reflected in the State estimates by requiring that all States add to the national CPS estimates of employment and unemployment each month. The Redesign method will significantly reduce end-of-year revisions.

What are a benchmark and real-time benchmarking?

A benchmark is a reliable total to which much less reliable estimates are controlled. For the LAUS Redesign models, the reliable control total (benchmark) is the monthly CPS national estimate of employment and unemployment. Real-time benchmarking means that the adjustment to the reliable control total (benchmarking) occurs as part of monthly estimation

(in real-time). The current method uses a State benchmark that is the CPS annual average of employment and unemployment. The current benchmarking method is historical in that we perform the correction retrospectively, at the end of the year, after twelve months of estimates are produced.

Why benchmark State labor force estimates to the U.S. levels? Why use the national estimates of employment and unemployment as the monthly benchmark?

The monthly national CPS labor force estimates provide an excellent benchmark because of its low variance. The confidence interval on the monthly national unemployment rate is ±0.2 percentage point, and the sample design is such that a difference of 0.2 percentage point in the unemployment rate over the month is statistically significant.

In the current methodology, each State's model estimates are prepared independent of each other. Although the monthly State CPS input data sum to the national measures, the sum of State model estimates generally do not equal the national CPS estimates. To evaluate model performance, each month the sum of State model estimates is compared to the national CPS estimates. Until 2001, the differences between the sum-of-State model estimates and the national CPS were well within sampling error of the national estimates. In 2001, significant deviations occurred in a number of months, specifically March, August, and October-December, when economic shocks to the economy related to the onset of the recession and the September 11 terrorist attacks occurred. These shocks were not adequately reflected in the State model estimates because the model viewed much of the increase in State CPS unemployment in these periods as related to sampling error. Large benchmark revisions to annual average levels result from the model dependence on historical data and its slow reaction to economic shocks.

The Redesign methodology requires the monthly State employment and unemployment model estimates to add to the national levels. This will preclude differences between the sum of State estimates and the national estimates, ensure that national shocks related to the business cycle or to an event such as the terrorist attacks of September 11 will be addressed, and significantly reduce annual revisions.

How do the new Redesign models compare with the current models?

The current signal-plus-noise models describe the CPS sample estimate as the sum of the true labor force value (signal) and sampling error (noise). Two models, one for the employment-population ratio and one for the unemployment rate, are developed for each State, the District of Columbia, New York City, the Los Angeles metropolitan area, and the respective balances of New York and California. The model of the signal is combined with the model of the error to arrive at the estimate of the true labor force value. In estimating the signal, the employment-population ratio model uses the ratio of statewide monthly estimate of workers on nonfarm payrolls to intercensal population data as an explanatory variable, along with flexible trend and seasonal variables. The unemployment rate model uses the ratio of unemployment insurance claimants who file for the CPS reference week to nonfarm payroll data, along with flexible trend and seasonal variables. Seasonal adjustment is performed external to the models, using X-11 ARIMA software. Benchmarking is performed to the CPS annual average employment and unemployment levels for each State and is accomplished retrospectively, at the end of each year.

The Redesign models are also signal-plus-noise models, where the signal is a bivariate model of the unemployment or employment levels. The unemployment insurance claims and nonfarm payroll employment inputs themselves are modeled, as well as their interaction with the appropriate CPS series. Seasonal, trend, and irregular components are developed for each modeled estimate. Seasonal adjustment occurs within the model structure through the removal

of the seasonal component. The models produce reliability measures for the seasonally adjusted and not adjusted series, and on over-the-month and over-the-year change. Each month, real-time benchmarking occurs in a two-step process. Census division models are constructed that are controlled to the national CPS. State models are then controlled to their appropriate division estimates.

How are estimates developed for the Census divisions?

The CPS employment and unemployment estimates for the nine Census divisions are directly modeled using univariate signal-plus-noise models. The models are similar to the State models, but do not use unemployment claims or nonfarm payroll employment as variables. This allows division models to be developed without sacrificing reliability, in a very timely manner before State inputs are even available. The estimates developed for nine division models are benchmarked to the national CPS. The benchmarked division model estimate is then used as the benchmark for the States within the division.

Why are States grouped into Census divisions? What is the rationale for using Census divisions as intermediate controls?

The nine Census divisions geographically exhaust the nation. These groupings are currently used to analyze and publish LAUS estimates. For LAUS estimation, the States are grouped into these Census divisions for which models are developed that provide reliable intermediate benchmark controls. Grouping States also simplifies the computational and operational aspects of real-time benchmarking. If all States were controlled directly to the national total, a delay in one State would impact everyone. While the Census division groupings have performed well, research will continue on alternative aggregations for State control purposes.

Because the State totals are controlled to their Census division estimates, if a division contains a large State, how will the monthly benchmark adjustment affect other States in the division?

The relative shares of each State's model estimates to its division total are preserved by the monthly benchmark adjustment, but the absolute size of the adjustment to a State's monthly model estimate will be directly related to the size of the model estimate. Thus, large States get larger adjustments than small States. As a result, smaller States in a division will not be dominated by one large State.

If a State in the division has an atypical CPS value for the month, how will that affect its estimates and the estimates of the other States in the division?

The model for the State with an atypical CPS value is likely to discount most of the atypical movement as survey error. Because the estimated survey error is removed from the State estimate before benchmarking is done, the atypical CPS value will not affect the benchmark adjustment.

What are the advantages of the new estimating approach? What are the disadvantages?
The advantages of the new estimating approach are:

- The production of reliability measures on the seasonally adjusted and not seasonally adjusted series and on over-the-month and over-the-year change, which will enhance analysis of the series.
- Direct seasonal adjustment of employment and unemployment, a methodological improvement.

- Greater understanding of the contributions of the non-CPS model inputs (unemployment insurance claims and nonfarm payroll employment) through bivariate modeling.
- Additivity to national and division estimates of employment and unemployment each month, thus ensuring the timely reflection of economic events in the State estimates.
- Reduction in the expected size of the annual revisions to the State employment and unemployment series through the use of real-time benchmarking to the national estimates.

The disadvantages of the new estimating approach are:

- The use of Census divisions as an intermediate estimation level requires interdependence of estimation among States in the division. States will no longer be able to produce final labor force estimates on their own.
- Interdependence of estimation makes the approach vulnerable in the event of missing State data. To preclude that, provision has been made to temporarily substitute model predictions for missing State data in the production of labor force estimates.
- The official annual averages of employment and unemployment for States from the LAUS program will no longer be identical to the sample-based annual average estimates from the CPS published in *Geographic Profile of Employment and Unemployment*.

Why is modeling as a technique superior to the direct use of household survey data?

The State CPS estimate for a given month is based on the corresponding sample for that month, which is too small to provide a reliable estimate. For most small States, the monthly CPS sample-based unemployment rate has a confidence interval of ±1.6 percentage points at the 90 percent level of confidence, which means that the rate must change by that amount to be considered significant. In contrast, the model estimates are based on the entire historical CPS series, beginning in 1976, as well as related series on unemployment insurance claimants and payroll employment. Based on this larger set of information, the models are able to provide much more stable estimates of employment and unemployment than is possible with the individual CPS sample estimates. In general, a change of ± 0.5 percentage point in the model estimate will be statistically significant. Also, adequate seasonal adjustment of the highly variable monthly CPS series is not possible, while the model will produce seasonally adjusted series.

Are the new models more accurate and reliable than the current models?

Yes. The current model cannot produce measures of error for the seasonally adjusted estimates, which makes it difficult to judge its reliability. The Redesign model will produce measures of error for both seasonally adjusted and not seasonally adjusted series, and for over-the-month and over-the-year change. Significant improvements in accuracy and reliability of the Redesign estimates reflect the provision of more comprehensive error measures and the use of real-time benchmarking to monthly levels of national employment and unemployment. Monthly national CPS data are more reliable than the State annual average estimates. At the end of the year, the current method puts much of the sampling error back into the estimates through benchmarking to State CPS annual averages. The Redesign method reduces both sampling error and bias in the estimates.

Can I still use the State CPS annual average demographic data published in *Geographic Profile of Employment and Unemployment*?

Yes. However, the 2005 data issued in *Geographic Profile* will not be equal to the official LAUS program estimates for employment and unemployment for States and published areas. The State and area data published in *Geographic Profile* are CPS sample-based estimates. The CPS is designed to produce annual average State labor force data with an 8 percent or less

coefficient of variation on the level of unemployment when the unemployment rate is 6 percent. The CPS State labor force estimates contain more variance than the model-based estimates, because the latter will reflect a national CPS benchmark as well as advanced modeling techniques. (In fact, the Redesign model estimates will have a coefficient of variation of approximately half that of the CPS.)

Although the annual average State CPS estimates will not be the official LAUS estimates, the State CPS sample does generate demographic information. While these estimates contain significant sampling error, they do provide important, relatively timely information on the characteristics of the State labor force and can be used in that regard. The annual average metropolitan area and central city data from the CPS also will not match the official LAUS estimates. These CPS data are highly variable as well, and are published to provide demographic detail.

How will the Redesign State models impact estimates for metropolitan areas, counties, and cities?

As part of the LAUS program Redesign, models are under development for the following areas and the respective balance-of-State areas: Chicago metropolitan division, Cleveland, Detroit metropolitan division, Miami, New Orleans, and Seattle-Everett metropolitan division. These models will follow the division form (univariate), will be benchmarked to the State employment and unemployment estimates on a real-time basis, and will be implemented with estimates for January 2005. Detailed information on area models will be issued shortly.

For areas other than those listed above, all substate areas in the State will be controlled to add to the monthly State estimates of employment and unemployment, as is the case with the current methodology. So, improvements in State estimation will be reflected in these substate estimates.

Are the Redesign model estimates being tested prior to implementation?

Yes. During 2004, all States are participating in a year-long period of dual estimation where estimates are made using both the current and Redesign model methodologies. Formal feedback on the Redesign models was provided to BLS in July, and additional feedback will be provided through the end of the year.

The new estimates differ from current estimates for the same period because of the improved modeling approach and the use of real-time benchmarking to monthly national employment and unemployment. The latter innovation allows the models to better reflect current economic activity.

Generally, how do the Redesign unemployment rates compare to the current official unemployment rates?

In the first six months of dual estimation, monthly estimates of the unemployment rate (not seasonally adjusted) developed using the Redesign method are somewhat higher than the rates based on the current official method. About 13 percent of the Redesign State monthly jobless rates were lower than the current estimates, 8 percent were the same, and 79 percent were higher. Where the Redesign estimate was higher, about half had differences of 0.2 percentage point or less, and half had higher. The differences vary by month and by State and reflect the individual State's inputs and their interactions, the interaction of the State with other States in the division, and the national economy. However, additional months may affect these results.

Are the current official estimates wrong?

No. The current estimates are based on the modeling and benchmarking approach that reflected state-of-the-art methodology and operations in 1994. To the extent possible, improvements were made in the years leading up to the proposed approach. Moreover, until the completion of the dual estimation period, the Redesign estimates should be considered developmental.

Does the Redesign model methodology change affect when labor force estimates will be released each month?

In the Redesign system, States enter their nonfarm payroll employment and unemployment insurance claimant input information the same way they do in the current system. However, final estimates cannot be made until all States in the relevant Census division have provided their inputs. (This contrasts with the current estimation where States are able to produce final estimates independently.) The final estimates for each Census division grouping of States are produced once all inputs have been provided to BLS.

The use of the Redesign models and methods will not impact the BLS release of State labor force estimates.

How will the LAUS Redesign affect historical comparisons?

The entire historical series from January 1976 forward will be replaced with estimates based on the Redesign models (thus extending the length of the series by 2 years). The revised historical data will also be available on the BLS website.

Will the States and areas still be benchmarked at the end of the year? What will be updated and benchmarked?

State estimates are benchmarked to the national CPS estimates of employment and unemployment each month via the Census division models. A modified annual historical benchmarking will still occur at the end of the year. It will involve updating of model inputs and population controls, model re-estimation, smoothing, and controlling to revised monthly historical benchmarked estimates at the division level, which in turn will sum to the monthly national CPS estimates.

While the effect of the Redesign models with real-time benchmarking will differ by State, it is expected that the annual revisions to employment and unemployment will be smaller than was experienced with the current models.

When will a fourth generation of models be introduced?

Since the introduction of the first generation of models in 1989, BLS has maintained a continuous program of research to develop further improvements to the models. Major advancements were introduced in 1994. Following the planned upgrade in 2005, work on model refinements will continue but major improvements on the level of a new generation will not be forthcoming for many years.

Where can I go to get technical information on the Redesign models?

See "Proposed Improvement in Estimating and Benchmarking State Labor Force Estimates" (PDF file available upon request, 98 K).

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